NATURE

A WEEKLY ILLUSTRATED JOURNAL OF SCIENCE.

"To the solid ground
Of Nature trusts the mind which builds for aye."—WORDSWORTH.

THURSDAY, MARCH 4, 1909.

ASPECTS OF MODERN SCIENCE.

Science in Modern Life. By several authors. Edited by Prof. J. R. Ainsworth Davis. Vol. i. Pp. xvi+188. Vol. ii. Pp. viii+187. (London: Gresham Publishing Co., 1908.) Price, each volume, 6*s.* net.

IT is intended in this work, which will be completed in six super-royal octavo volumes, to survey the whole ground of science in its modern developments and aspects, and to present the results in language capable of being comprehended by lay readers. "Briefly," the prospectus states, "its aim is to give a connected account of present-day science, with special reference to its influence on modern life." A number of illustrations in the text, and many full-page plates—some in black-and-white, and others in colour—add to the interest and attractiveness of the work.

In the first volume, Mr. A. C. D. Crommelin deals with astronomy, and Mr. O. T. Jones with geology. In some respects the treatment of both subjects is reminiscent of text-book style. There can, indeed, be little difference between a good text-book and a work of this character: the fault of both, from the point of view of the average reader, is that of attempting too much. The student desires conciseness and comprehensiveness in his science manuals, but for the general reader these qualities should be subservient to that of lofty and stimulating thought. Unless this is borne in mind, a work upon any branch of science must become chiefly a catalogue of facts and theories no more interesting than a Hebrew genealogy.

The opening volume cannot claim a high place as an apostolic statement of the scientific spirit, or as a work distinguished by scope or style from a multitude of others. It is, however, an accurate and orderly record of the chief results of scientific inquiry in the domains of astronomy and geology; and as such it should achieve success. Mr. Crommelin devotes more attention to modern problems of astronomy than is usually the case, and has managed to compress a large amount of information in the seventy-one pages taken up by his section of the volume. Readers acquainted with the principles of physics will follow with interest the work described, but without this knowledge some parts will be unintelligible. For instance, about a dozen lines are devoted to the spectroscope and spectroheliograph; and it is obvious that unless the reader knows something more about these instruments, clear ideas as to the meaning of the results obtained by them can scarcely be anticipated. Mr. Jones begins with denudation and deposition, and passes to earth movements and igneous and metamorphic rocks, and cycle of denudation; he then indicates how the geographies of past ages can be reconstructed, and describes the changes and characteristics of the various periods. A good series of full-page maps, and a coloured geological map of the British Isles, are valuable aids to the study of the text.

The second volume contains the conclusion of Mr. Jones's treatment of geology, a contribution on chemistry by Mr. J. P. Millington, and one on physics is commenced by Mr. J. H. Shaxby. As Mr. Millington has essayed to present the most prominent points of organic, inorganic, and industrial chemistry in about 40,000 words, his task has been a difficult one, but his performance of it is very creditable. Whether the significance of some of the statements made—particularly in the treatment of organic chemistry—will be understood without a preliminary study of the subject must be left to individual experience to decide. The noteworthy characteristic of Mr. Shaxby's chapters on measurement, motion, properties of matter and heat, and, indeed, of the greater part of the work, is the attention given to modern research and thought.

In a work by several authors, equality of treatment and the ability to distinguish between the essential and unessential can rarely be secured from all contributors; and no greater success in this direction can reasonably be hoped for than that realised in the present volumes. At the same time, we may remark that the three sections so far completed differ from each other in scope and style; one suggests the text-book, another is too systematic to be of

© 1909 Nature Publishing Group

interest, and the third is difficult to follow in parts except by readers having some acquaintance with the subject. Probably the work will be best read and appreciated by readers who have already acquired a rudimentary knowledge of scientific principles and desire to know something of the problems and positions of branches of natural knowledge beyond the boundary of their own experience.

A sectional model of the frog, showing the external and internal parts of the animal, and its development from the fertilised egg to the stage in which the tail of the tadpole has nearly disappeared and the hind- and fore-legs are present, is presented with the second volume. The model should be of assistance in suggesting instructive observations to the student or teacher of natural history.

When the work is completed it will form a very useful compendium of pure and applied science, and should find a place on the shelves of many libraries. The editor is to be congratulated upon the plan, and the publishers upon the attractive form in which they have executed it.

THE EXPERIMENTAL METHOD IN ZOOLOGICAL RESEARCH.

Experimental Zoology. Part i., Embryogeny: an Account of the Laws governing the Development of the Animal Egg as ascertained through Experiment. By Dr. Hans Przibram. Pp. viii+124; 16 plates. (Cambridge: University Press, 1908.) Price 7*s.* 6*d.* net.

THE publication of a new work on experimental zoology is a sign of the times. Until comparatively lately the experimental method was not widely adopted in the pursuit of zoological inquiry. The morphologist, as a general rule, confined his attention to the form and structure of animals and the changes through which these pass in the progress of individual development, without regard to the different ways in which form and structure arise in embryogeny and the forces which control the modes of growth.

The founding of the *Archiv für Entwickelungsmechanik* was a new departure in serial zoological literature, and served to emphasise the growing importance of that branch of study which is called developmental mechanics, while the subsequent issue in America of a new journal, *The Journal of Experimental Zoology,* in which the range of subjects discussed is somewhat more extensive, was a further advance in the recognition of the experimental method as a means of zoological research. Still more recently Prof. T. H. Morgan has published a volume on "Experimental Zoology" in which he deals not only with problems of animal morphology, but with others which are in their essential nature physiological. But physiology, as ordinarily understood, still tends to signify human physiology, and the study of function in the lower forms of life, excepting in so far as it serves directly to elucidate the vital processes of the higher animals, and more particularly man, remains as yet a much neglected department of biology.

Experimental zoology may be held to comprise all those branches of zoological inquiry, whether morphological or physiological, which are conducted by observation combined with experiment. That the fundamental problems in biology cannot be solved without recourse to the experimental method is a generalisation which zoologists have been a little slow to accept, and the complete absence in this country (and, indeed, in nearly every country) of experiment stations where animals can be kept under constant observation in a natural and healthy environment is a circumstance which contrasts strangely with the comparative wealth of equipment in other branches of observational science. It is greatly to be hoped, therefore, that the appearance of such works as Dr. Hans Przibram's, which is to treat of all departments of experimental zoology, will be the means of compelling greater attention to the pressing needs of this branch of study.

We are told in the preface that the work is to be issued in five parts, each of which is to be complete in itself. The present volume deals with fertilisation and the first development of the individual organism without regard to its origin; the phenomena of regeneration are to be discussed in part ii.; variation and heredity in part iii.; the growth of the developed organism and the relation between the cell nucleus and the cytoplasm in part iv.; while the last volume is to be devoted to general physiological problems, including that of sex. The part now under notice is an English translation by Miss Hertha Sollas of a German edition published last year.

We are informed at the end of the preface that "the author has read the proofs [of the translation] and has made such additions as were necessary to bring it up to date." Nevertheless, we cannot refrain from remarking on the absence of any reference to several not unimportant papers that have appeared in recent years, and in our opinion the first chapter is calculated to convey a wrong impression of the present state of the fertilisation problem. Thus it is recorded that Winkler succeeded in fertilising sea-urchin ova with the extracted juice of spermatozoa, but there is no mention of the subsequent work of Gies (published so long ago as 1901), which showed that Winkler's results were due to osmotic influences, and not to the action of the sperm extract. Gies's interpretation has since been accepted by Loeb, while Pichou's results (published in 1905) were confirmatory of those of Gies. There is at present no experimental evidence that spermatozoa contain specific substances which, when extracted, are capable of fertilising ova. Again, in the italicised conclusion at the end of the first chapter we read that

> "the cause which determines the transition of the resting animal egg cell to a state of progressive development must be sought in an acceleration of the vital processes which, even in the resting egg, are always going on."

Loeb, however, has pointed out (1906) that if such a conclusion were correct, normal sea-urchin eggs

© 1909 Nature Publishing Group